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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/805,121	03/19/2004	Sanjeev Aggarwal	TI-36294	8911
23494	7590	07/01/2005	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED			MENZ, DOUGLAS M	
P O BOX 655474, M/S 3999			ART UNIT	
DALLAS, TX 75265			PAPER NUMBER	
			2891	

DATE MAILED: 07/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/805,121	Applicant(s) AGGARWAL ET AL.	
	Examiner Douglas M. Menz	Art Unit 2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 8-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input checked="" type="checkbox"/> Other: <u>Search History</u> . |

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group I, claims 1-7, in the reply filed on 6/20/05 is acknowledged.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3 are rejected under 35 U.S.C. 102(e) as being anticipated by Lane et al. (US 6787912).

Regarding claim 1, Lane discloses a copper interconnect structure, comprising:

A semiconductor substrate (14, Figs. 1,4);

A dielectric layer (12) over the semiconductor substrate (Figs. 1,4 and Col. 3, lines: 5-10);

A trench (10) in the dielectric layer (Figs. 1,4 and Col. 3);

A barrier layer (20) in the trench wherein the barrier layer comprises a material from the group consisting of iridium, ruthenium, rhodium, platinum and palladium (Figs. 1,4 and Col. 3, lines: 50-67); and

Copper (22) filling the trench over the barrier layer (Fig. 4 and Col. 3, lines: 63-67 and Col. 7, lines: 26-35).

Regarding claim 2, Lane further discloses the structure comprising:

A via (*bottom of 10*) in the dielectric layer (12, Figs. 1, 4 and Col. 4);

A trench in the dielectric layer (10, Figs. 1, 4 and Col. 4);

A barrier layer (20) in the via wherein the barrier layer comprises a material from the group consisting of iridium, ruthenium, rhodium, platinum and palladium (Figs. 1,4 and Col. 3, lines: 50-67); and

Copper (22) filling the via over the barrier layer (Fig. 4 and Col. 3, lines: 63-67 and Col. 7, lines: 26-35).

Regarding claim 3, Lane further discloses wherein the via (*bottom of 10*) is positioned beneath the trench (Figs. 1, 4).

Claims 4-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Omstead (US 6713373).

Regarding claim 4, Omstead discloses a copper interconnect structure, comprising:

- A semiconductor substrate (Col. 2, lines: 30-37);
- A dielectric layer (304, Figs. 3-8) over the semiconductor substrate;
- A trench (312, Fig. 3) in the dielectric layer (Col. 3, lines: 45-50);
- A first barrier layer (404, Figs. 4-8) in the trench wherein the barrier layer comprises ruthenium oxide (Col. 3, lines: 50-60); and
- Copper (704, Fig. 7 and 804, Fig. 8) filling the trench over the barrier layer (Col. 5, lines: 22-40).

Regarding claim 5, Omstead further discloses the structure further comprising:

- A via (316, Fig. 3) in the dielectric layer (Col. 3, lines: 45-50);
- A trench (312, Fig. 3) in the dielectric layer (Col. 3, lines: 45-50);
- A first barrier layer (404, Figs. 4-8) in the via wherein the first barrier layer comprises ruthenium oxide (Col. 3, lines: 50-60); and
- Copper (704, Fig. 7 and 804, Fig. 8) filling the via over the barrier layer (Col. 5, lines: 22-40).

Regarding claim 6, Omstead further discloses wherein the via is positioned beneath the trench (Figs. 3-8).

Regarding claim 7, Omstead further discloses comprising a second barrier layer (504, Figs. 5-8) wherein the second barrier layer comprises ruthenium (Col. 4, lines: 15-30).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas M. Menz whose telephone number is 571-272-1877. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DM

 6/27/05